

# **Bioaccumulation of Polychlorinated Biphenyls in the Delaware River Estuary**

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## **EXECUTIVE SUMMARY**

In anticipation of promulgating polychlorinated biphenyl (PCB) Total Maximum Daily Loads (TMDLs) for the Delaware River, the Delaware River Basin Commission (DRBC) has begun to formulate a bioaccumulation model that will be relied upon during their regulatory efforts in the control of PCBs. However, in order to calibrate and validate this model, DRBC requires reliable data sets summarizing PCB concentrations in biota within each of its four water quality zones. To meet this need, a spatially comprehensive evaluation of PCB inventories in selected biota and sediment within the Delaware River was completed. During two seasons (fall, 2001 and spring, 2002), white perch, channel catfish, invertebrates, small prey fish and sediment were collected from four zones of the Delaware River (Zones 2-5) and analyzed for a suite of PCB congeners. Highest concentrations of PCBs were found in the Zones 3 and 4 sediments resulting from greater inputs due to proximity to both non-point and point sources in the urbanized and industrialized sectors adjacent to these zones. Whole organism body burdens (white perch, channel catfish, invertebrates, and small prey fish) reflected these zonal distributions in sediment concentrations; Zones 3 and 4 harbored the highest biotic PCB concentrations (both on a wet weight and lipid normalized basis). There was considerable variation in t-PCB concentrations for individual catfish and perch fillets within a region of a zone. These differences were not significantly reduced upon lipid normalization of t-PCB concentrations suggesting that within a zone, there may be many factors driving accumulation such as dietary shifts, small-scale (within zones) heterogeneity in sediment contamination, and non-equilibrium conditions in contaminant partitioning. Predator/prey ratios revealed greater bioaccumulation from select prey items (amphipods and prey fish) in spring-collected predators. However, these ratios should be used only as rough indicators of bioaccumulation because of the dietary shifts that occur spatially and temporally within and among zones. With down-estuary distances, all biota except for perch had enhanced concentrations of more chlorinated congeners, especially octa-, nona- and deca-chlorinated biphenyls. Specific congeners such as PCB 206 and 209 may act as indicators of specific and unique local sources of contamination within zones of the Delaware River estuary. With the data sets generated and the associated knowledge gained from them, we anticipate that a more accurate representation of PCB concentrations may be modeled, enhancing DRBC's predictive capability and its ability to set appropriate scientifically-sound TMDLs.